**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
**REGION 5**
**77 WEST JACKSON BOULEVARD**
**CHICAGO, ILLINOIS 60604**

**DATE:** NOV 0 9 2018

**SUBJECT:** CLEAN AIR ACT INSPECTION REPORT
Grede LLC, New Castle, Indiana

**FROM:** Sarah Clark, Environmental Engineer
AECAB (IL/IN)

**THRU:** Nathan Frank, Section Chief
AECAB (IL/IN)

**TO:** File

---

## Basic Information

**Facility Name:** Grede LLC (Grede)

**Facility Location:** 2700 East Plum Street, New Castle, Indiana

**Date of Inspection:** September 17, 2018

**EPA Inspectors:**
1. Sarah Clark, Environmental Engineer
2. Gina Harrison, Environmental Scientist

**Other Attendees:**
1. Wyman Clark, Air Compliance Inspector, Indiana Department of Environmental Management
2. Jeffrey Fernung, Environmental Coordinator, Grede
3. Mark Llewellyn, Plant Engineering Manager, Grede
4. Shane Beckley, Core Room Manager, Grede
5. Brett Waldon, Project Engineer, Grede

**Contact Email Address:** jeffrey.fernung@aam.com

**Purpose of Inspection:** Assess compliance with the Clean Air Act (CAA), the Indiana State Implementation Plan (SIP), and the Title V permit.

**Facility Type:** Iron foundry

**Regulations Central to Inspection:** 40 C.F.R. Part 63, Subpart EEEEE, National Emission Standards for Hazardous Air Pollutants (NESHAP) for Iron and Steel Foundries, Indiana SIP, Title V permit.

**Arrival Time:** 2:00 PM
**Departure Time:** 6:00 PM

**Inspection Type:**
☒ Unannounced Inspection
☐ Announced Inspection

## OPENING CONFERENCE

☒ Credentials Presented
☒ CBI warning to facility provided

The following information was obtained verbally from Mr. Fernung and/or Mr. Llewellyn unless otherwise noted.

**Company Ownership:** This facility was owned by Grede LLC from 2010 to August 2014, and later owned by Metadyne Performance Group from August 2014 to April 2017. The current owner, since 2017, is American Axle Manufacturing (AAM). The facility retains the Grede LLC name on the facility's permit.

**Process Description:**
The Grede foundry manufactures ductile iron parts for the automotive industry, such as parts for use in medium- and heavy-duty trucks.

To make cores (molded sand shapes used to make internal voids in castings), core sand (sand pre-mixed with two-part phenolic resin) is fed into the interior of a core machine; the core machine is sealed with double o-rings; and amine catalyst is injected along with heated air where it reacts with the resin to solidify the core sand in the required shape. Molds (forms used to shape the exterior of castings) are made from sand at Mold Line #1 and Mold Line #2. Cores are then placed inside molds to form the required pattern for each part.

The mold machine creates a mold by mating a customer-specific pattern with a steel flask. The flask is filled with prepared mold sand, which comes from a hopper located above the mold machine. The hopper then delivers and compresses the sand tightly into the flask. The pattern is removed, leaving the impression of the part to be cast. The mold is then filled with molten iron, cooled, and the remaining sand is removed in shakeout. Sand removed from the casting is hot and enters the return sand system, where iron and any large pieces are removed before being processed through the process sand system, starting with the sand cooler, where the sand is mixed with water to cool it. The cooled sand is then fed into the muller, where it's mixed with specific amounts of water and bond to create a precise strength and compatibility range. The prepared sand then enters the prepared sand system, where its final destination is the hopper that feeds the mold machine.

Grede purchases scrap steel and processes its own returns. The metal is first dried in a scrap preheater before a crane is used to transfer the metal into one of four electric induction furnaces (EIFs). The molten metal is poured into a ladle where alloying (metal addition) and/or inoculation (magnesium addition) occurs. The molten metal is transferred inside the ladle to one of two pressure pour (or holding) furnaces which serve Line 1 and Line 2 by using nitrogen gas to pour molten metal into the molds. After the newly casted parts have cooled, the sand is shaken out, and the parts are inspected, ground, trimmed, and inspected again before shipping to the customer.

The core-making process is controlled by a dust collector and wet acid scrubber in series. The EIFs and the inoculation/alloying process are controlled by dust collector #7. On Mold Line #1, the sand muller, metal pouring operation, metal cooling operation, and mold shakeout operation are controlled by dust collectors #1 and #3. On Mold Line #2, the sand handling operations and shakeout are controlled by dust collectors #2 and #5; the metal pouring and metal cooling operations on Mold Line #2 are uncontrolled. The finishing steps (i.e., shot blasting, grinding, and belt blasting) on Mold Lines #1 and #2 are controlled by dust collectors #6 and #10.

**Staff Interview:**
According to the Grede staff, approximately 310-320 employees work at this facility and thousands of employees work for AAM worldwide. The facility makes cores approximately 6 days per week and operates the furnace/casting operations about 5 days per week while working 3 shifts per day. If there is a surge period, the facility may operate 6-7 days per week. According to Mr. Fernung, 1500 molds per day would be a "very good day." From pouring to leaving the cleaning room, the staff estimate that it takes approximately 45 minutes to 1 hour and 15 minutes to process a newly cast part. The staff estimate annual output as approximately 65,000 tons of castings. When asked how the staff track coremaking emissions, Mr. Fernung explained that he collects accounting/purchasing records and production data per machine to track the resin and sand usage monthly. He explained that he can estimate amine usage from the core sand/amine ratio, which is a set ratio across each machine.

## TOUR INFORMATION

**EPA toured the facility:** Yes

**Data Collected and Observations:**
The facility was operating at the time of our inspection. We first toured the scrubber and core machines (Image/Video #1-5). Mr. Fernung climbed over a railing to check the differential pressure (dP) of the scrubber, which he stated was 2.4 inches of water (in $H_2O$). We smelled strong odors in this room. At the West 321 core machine, we observed the periodic discharge of core sand. We met with Mr. Beckley who explained that the core sand needs to be knocked off the machine each time it makes a core or else the sand will solidify on the machine. He said that the particles are large because they are coated with resin. We accompanied Mr. Beckley to his office where he described how Grede monitors and maintains the scrubber and showed us the

database he uses to track pH and other readings. He explained that the current pH reading that we observed (-3.5) was inaccurate; he said that his staff had recently replenished the scrubber with fresh acid, so the actual pH was too low to register on the pH probe. He estimated that it takes about 1-1.5 weeks for the pH probe to accurately measure the pH.

Next, we met with Mr. Waldon to discuss the air pollution control systems and associated capture and collection/ventilation systems used to control air emissions from the core-making, furnace melting, inoculation/alloying, pouring, and finishing processes. We referenced the facility map layout (claimed as confidential business information or CBI) and a printed table of dust collector specifications provided by Mr. Waldon during this discussion. He explained that control for the core machines is dictated more by static pressure than air flow but he estimated the air flow to be approximately 400 cubic feet per minute (cfm) per core machine.

We then observed the electric induction melting furnaces and inoculation/alloying operations (Image/Video #6-14) where we observed uncaptured emissions rise to the ceiling and exhaust out the roof vent. At Furnace #1, we watched as the "charge bucket" was repeatedly lifted and set back down again on the pile of scrap set atop the furnace. Mr. Fernung informed Ms. Clark that the scrap pile was too high, and that the "charge bucket" was being used to physically push the scrap further into the furnace. We also observed a jolted movement with the hood for Furnace #1: after the charge bucket was removed, we watched as the hood approached the furnace opening, stopped, and retracted. Mr. Llewellyn told Ms. Harrison that this was a malfunction. At the inoculation station by Furnace #3, Ms. Clark observed uncaptured emissions rise toward the ceiling. Mr. Fernung informed Ms. Clark that this inoculation station hood was experiencing a malfunction with the damper position: the damper was closed when it would normally be open during inoculation. The dP for dust collector #7 was 6.5 in $H_2O$.

While walking along Line 1, Ms. Clark noticed a sporadic spray from one of the pipes, above, that led to Line 1. Mr. Fernung explained that this was likely a "bond leak" and that it was a common malfunction.

The dP for dust collectors #2, #5, and #10 were 5.5, 5.0, and 5.5 in $H_2O$, respectively. All three pressure gauges were calibrated on May 7, 2018 according to a label on each gauge.

**Photos and/or Videos:** were taken during the inspection.

**Field Measurements:** were not taken during this inspection.

## RECORDS REVIEW

1. Facility Map Layout (obtained, CBI)
2. Dust Collector Specifications (obtained)

## CLOSING CONFERENCE

**Requested documents:**

- Any existing/previously performed computational fluid dynamic modeling/specifications for capture and collection systems
- Contractor duct rebalancing
- Annual duct work cleaning/preventative maintenance
- 2017 Stack test report for dust collectors #1, #6, #7, and #10
- Past month of visible emission readings
- Past two semiannual fugitive opacity readings (Method 9)
- Review opacity logs to determine whether a 15-min average or single data point

Ms. Clark asked for details about the maintenance process and whether work orders would be generated for some of the malfunctions that were observed during the plant tour. Mr. Fernung explained that a work order is only generated when a repair requires more than one hour to fix.

**Concerns:** Inspectors expressed concern about the effectiveness of the capture and collection systems at coremaking processes and at the furnaces.

## SIGNATURES

Report Author: Sarah Clark Date: 11/8/2018

Section Chief: [signature] Date: 11/9/18

**Facility Name:** Grede LLC
**Facility Location:** 2700 East Plum Street, New Castle, Indiana
**Date of Inspection:** September 17, 2018

## APPENDICES AND ATTACHMENTS

1. Appendix A: Digital Media Log

**Facility Name:** Grede LLC
**Facility Location:** 2700 East Plum Street, New Castle, Indiana
**Date of Inspection:** September 17, 2018

## APPENDIX A: DIGITAL MEDIA LOG

| | |
|---|---|
| 1. **Inspector Name:**<br>Sarah Clark | 2. **Date of Inspection:**<br>September 17, 2018 |
| 3. **Company/Facility Name:**<br>Grede LLC | 4. **Street Address, City, State:**<br>2700 East Plum Street, New Castle, Indiana |
| 5. **Number of Images:**<br>14 | 6. **Archival Record Location:**<br>"Grede LLC, 2700 E Plum St, New Castle, IN, Inspection Photos 9-17-2018" |

| Media No. | File Name | Date and Time (EDT) | Latitude and Longitude | Description of Image |
|---|---|---|---|---|
| 1 | P9170001.JPG | 9/17/2018 15:13 | 39.925833<br>-85.351389 | dP gauge on wet acid scrubber system |
| 2 | P9170002.JPG | 9/17/2018 15:25 | 39.925833<br>-85.351389 | West 321 Core Machine |
| 3 | P9170003.MOV | 9/17/2018 15:27 | N/A | Video 1 of West 321 Core Machine – operation paused |
| 4 | P9170004.MOV | 9/17/2018 15:28 | N/A | Video 2 of West 321 Core Machine – active operation, sand discharged |
| 5 | P9170005.JPG | 9/17/2018 15:29 | 39.925833<br>-85.351389 | Sand on floor near West 321 Core Machine |
| 6 | P9170006.JPG | 9/17/2018 16:19 | 39.925833<br>-85.351389 | Electric induction furnace (EIF), Furnace #1, charging |
| 7 | P9170007.MOV | 9/17/2018 16:19 | N/A | Video 1 of Furnace #1, charging |
| 8 | P9170008.JPG | 9/17/2018 16:20 | 39.925833<br>-85.351389 | Roof vent over EIFs |
| 9 | P9170009.MOV | 9/17/2018 16:21 | N/A | Video 2 of Furnace #1, charging |
| 10 | P9170010.JPG | 9/17/2018 16:22 | 39.925833<br>-85.351389 | Furnace #3, inoculation station |
| 11 | P9170011.MOV | 9/17/2018 16:24 | N/A | Furnace #1, charging and hood closure interruption |
| 12 | P9170012.JPG | 9/17/2018 16:34 | 39.925833<br>-85.351389 | Furnace #3, inoculation station, metal pour |
| 13 | P9170013.JPG | 9/17/2018 16:40 | 39.925833<br>-85.351389 | Furnace #3, inoculation station, damper position indicator showing that damper is in closed position |
| 14 | P9170014.JPG | 9/17/2018 16:40 | 39.925833<br>-85.351389 | Furnace #3, inoculation station, damper position indicator showing that damper is in closed position |